OUTPUT PENTODE

EL34

Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.

HEATER

V_h	6.3	V
I_h	1.5	A

CAPACITANCES

c_{out}	8.4	pF
c_{in}	15.2	pF
c_{a-g1}	<1.0	pF
c_{g1-h}	<1.0	pF
c_{h-k}	11	pF

CHARACTERISTICS

←

Pentode connection

V_a	250	V
V_{g2}	250	V
V_{g3}	0	V
I_a	100	mA
I_{g2}	15	mA
V_{g1}	-12.2	V
g_m	11	mA/V
r_a	15	kΩ
μ_{g1-g2}	11	
V_{g1} max. ($I_{g1} = +0.3\mu A$)	-1.3	V

Triode connection
(g_2 connected to a)

V_a	250	V
I_a	70	mA
V_{g1}	-15.5	V
g_m	11.5	mA/V
r_a	910	Ω
μ	10.5	

OPERATING CONDITIONS AS SINGLE VALVE CLASS "A" AMPLIFIER

Pentode connection

V_a	250	300	V
V_{g2}	250	300	V
V_{g3}	0	0	V
R_k	106	190	Ω
R_a	2.0	3.5	kΩ
I_a	100	83	mA
I_{g2}	15	13	mA
$V_{in(r.m.s.)}$ (P_{out} = 50mW)	500	450	mV
$V_{in(r.m.s.)}$	8.0	8.2	V
*P_{out}	11	11	W
*D_{tot}	10	10	%

*P_{out} and D_{tot} are measured at fixed bias and therefore represent the power output available during the reproduction of speech and music. When a sustained sine wave is applied to the control-grid the bias across the cathode resistor will readjust itself as a result of the increased anode and screen-grid currents. This will result in a reduction in power output of approximately 10%.



EL34

OUTPUT PENTODE

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Distributed load conditions for maximum output (screen-grid tapping at 20% of primary turns)

V_b	450	V
R_{g2} (per valve)	1.0	kΩ
R_k (per valve)	500	Ω
R_{a-a}	7.0	kΩ
$I_{a(o)}$	2×55	mA←
$I_{g2(o)}$	2×9.0	mA←
$V_{in(g1-g1)r.m.s.}$	55.2	V
P_{out}	40	W
D_{tot}	4.5	%
$I_{a(max. sig.)}$	2×74	mA
$I_{g2(max. sig.)}$	2×9.0	mA

Distributed load conditions for minimum distortion (with screen-grid tapping at 43% of primary turns)

V_b	430	430	V
R_{g2} (per valve)	1.0	1.0	kΩ
R_k (per valve)	470	470	Ω
R_{a-a}	6.0	6.0	kΩ
$I_{a(o)}$	2×62.5	2×62.5	mA
$I_{g2(o)}$	2×10	2×10	mA
$V_{in(g1-g1)r.m.s.}$	35	50	V
P_{out}	20	34	W
D_{tot}	0.35	2.5	%
$I_{a\ (max.\ sig.)}$	2×65	2×70	mA
$I_{g2(max. sig.)}$	2×10.2	2×14	mA

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Fixed bias

V_b	375	400	V
V_{g3}	0	0	V
*R_{g2}	600	800	Ω
V_{g1}	−33	−36	V
R_{a-a}	3.5	3.5	kΩ
$I_{a(o)}$	2×30	2×30	mA
$I_{g2(o)}$	2×4.7	2×4.5	mA
$V_{in(g1-g1)r.m.s.}$	46.7	50	V
P_{out}	48	54	W
D_{tot}	2.8	1.6	%
$I_{a(max. sig.)}$	2×107.5	2×110.5	mA
$I_{g2\ (max.\ sig.)}$	2×23.5	2×23	mA

*Screen-grid resistor common to both valves.

Cathode bias

V_b	375	450	V
V_{g3}	0	0	V
*R_{g2}	0.47	1.0	kΩ
R_k (per valve)	260	465	Ω
R_{a-a}	3.5	6.5	kΩ
$I_{a(o)}$	2×75	2×60	mA
$I_{g2(o)}$	2×12.5	2×10	mA
$V_{in(g1-g1)r.m.s.}$	40	54	V
P_{out}	35	40	W
D_{tot}	1.7	5.1	%
$I_{a(max.\ sig.)}$	2×94	2×71.5	mA
$I_{g2(max.\ sig.)}$	2×19.5	2×22	mA

*Screen-grid resistor common to both valves.

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Triode connection (g_2 connected to a, g_3 to k) with separate cathode bias resistors.

With R_k bypassed

V_b	430	V
V_a	400	V
V_{g3}	0	V
R_k (per valve)	440	Ω
R_{a-a}	5.0	kΩ
$I_{a(o)}$	2×70	mA
$V_{in(g1-g1)r.m.s.}$	48	V
P_{out}	19	W
D_{tot}	1.8	%
$I_{a(max.\ sig.)}$	2×75	mA

With R_k unbypassed

V_b	430	V
V_a	400	V
V_{g3}	0	V
R_k (per valve)	440	Ω
R_{a-a}	10	kΩ
$I_{a(o)}$	2×70	mA
$V_{in(g1-g1)r.m.s.}$	48	V
P_{out}	14	W
D_{tot}	0.4	%
$I_{a(max.\ sig.)}$	2×73	mA



OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL WITH CONTINUOUS SINE WAVE DRIVE

Fixed bias

V_b	375	400	V
V_{g3}	0	0	V
R_{g2}	1.0	1.5	kΩ
V_{g1}	−32	−35.5	V
R_{a-a}	3.5	3.5	kΩ
$I_{a(o)}$	2×30	2×30	mA
$I_{g2(o)}$	2×4.4	2×4.4	mA
$V_{in(g1-g1)r.m.s.}$	45	50	V
P_{out}	42	51	W
D_{tot}	3.0	1.8	%
$I_{a(max.\ sig.)}$	2×98	2×106	mA
$I_{g2(max.\ sig.)}$	2×19	2×21	mA

Cathode bias

Any of the cathode bias conditions published in this data sheet are suitable for continuous sine wave drive.

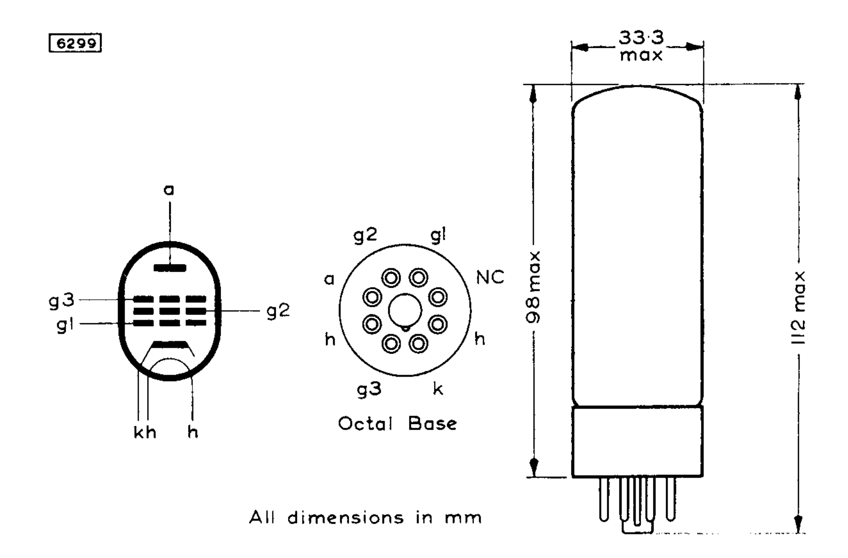
DESIGN CENTRE RATINGS

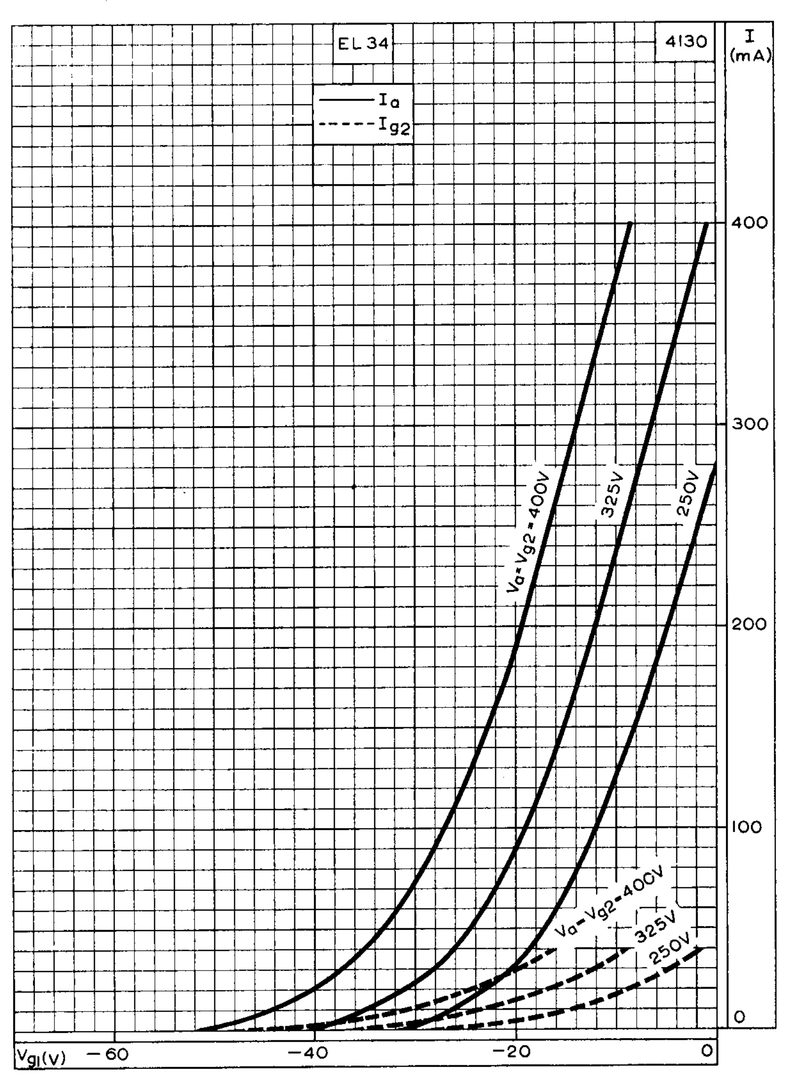
$V_{a(b)}$ max.	2.0	kV
V_a max.	800	V
p_a max.	25	W
$V_{g2(b)}$ max.	800	V
V_{g2} max.	500	V
p_{g2} max.	8.0	W
I_k max.	150	mA
R_{g1-k} max.	500	kΩ
V_{h-k} max.	100	V
R_{h-k} max.	20	kΩ

Triode connected

V_a max.	600	V
p_{a+g2} max. (V_a = 500V)	30	W
p_{a+g2} max. (V_a = 600V)	15	W



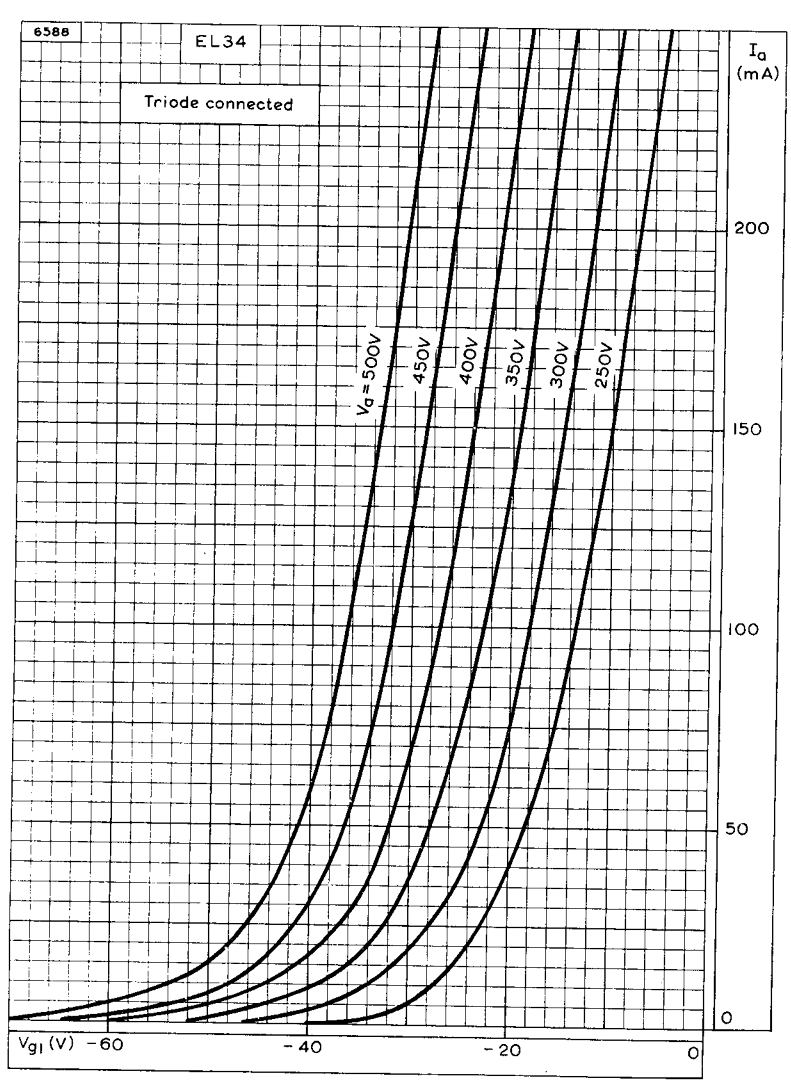

6299
a
g3
g1
g2
kh
h
g2
g1
a
NC
h
h
g3
k
Octal Base
33·3
max
98 max
112 max
All dimensions in mm



ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST CONTROL-GRID VOLTAGE WITH ANODE AND SCREEN-GRID VOLTAGES AS PARAMETERS

ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER





ANODE CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE WITH ANODE VOLTAGE AS PARAMETER WHEN TRIODE CONNECTED

EL34

Triode connected

V_{g1} = 0V

−5V

−10V

−15V

−20V

−25V

−30V

−35V

p_{a+g2} = 30W

V_a (V)

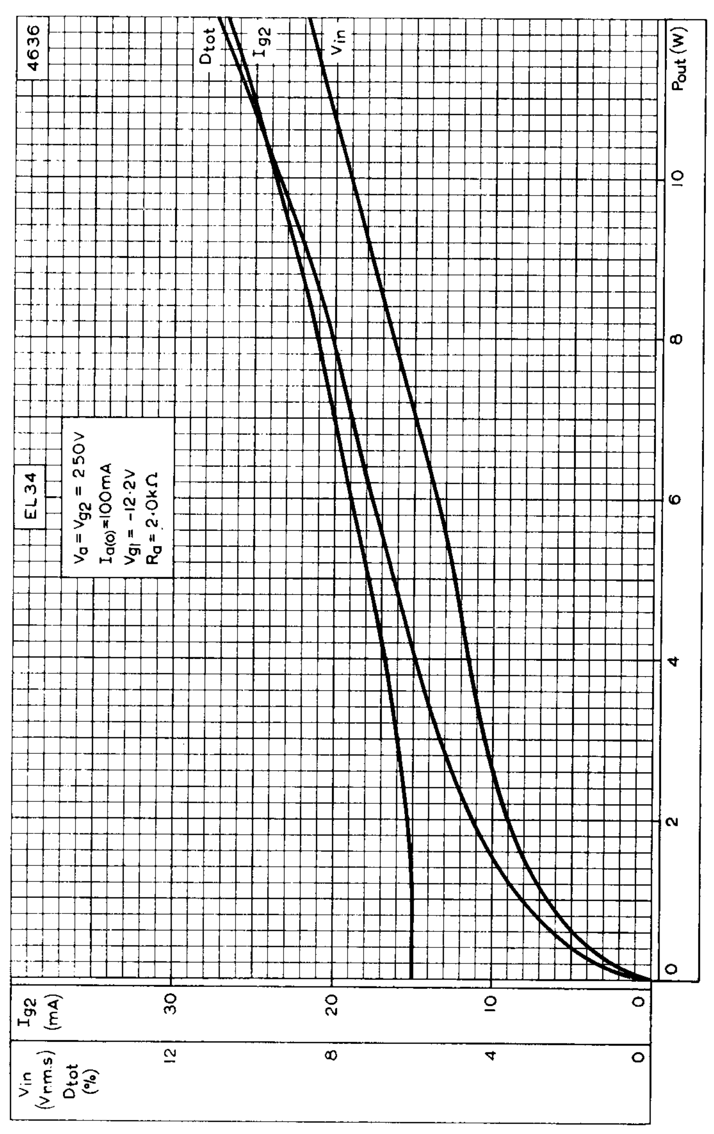
0 100 200 300 400

I_a (mA)

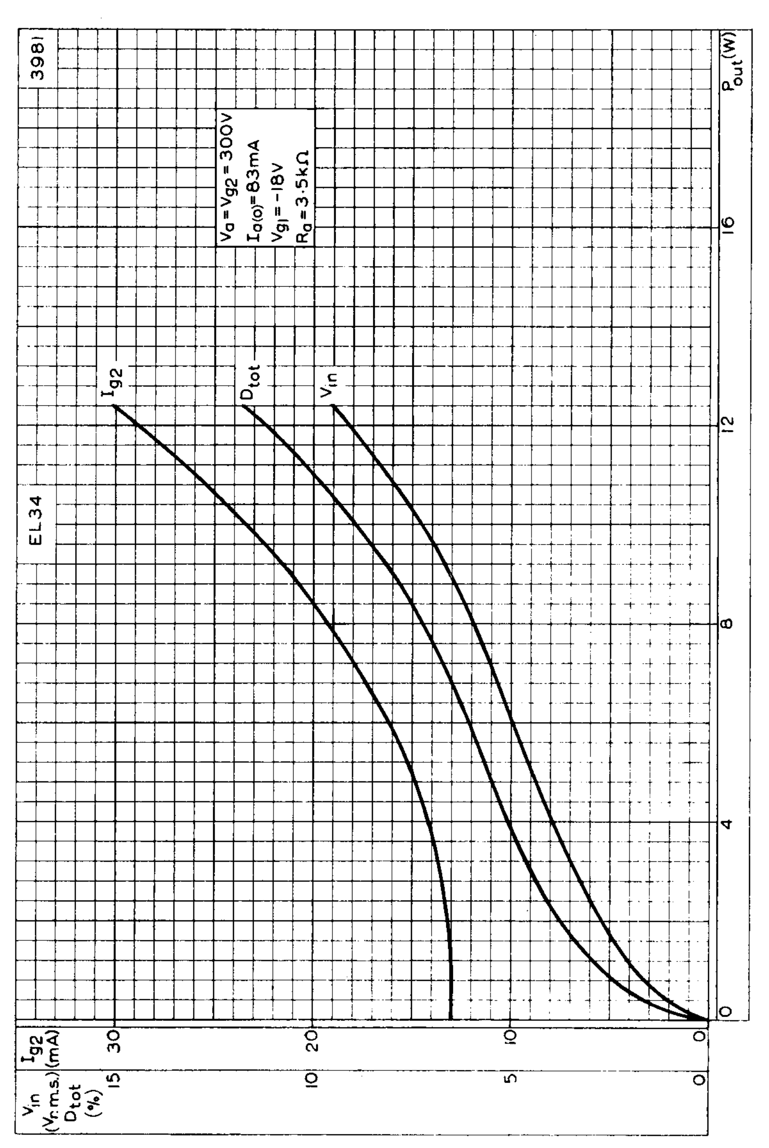
300 200 100 0

6589

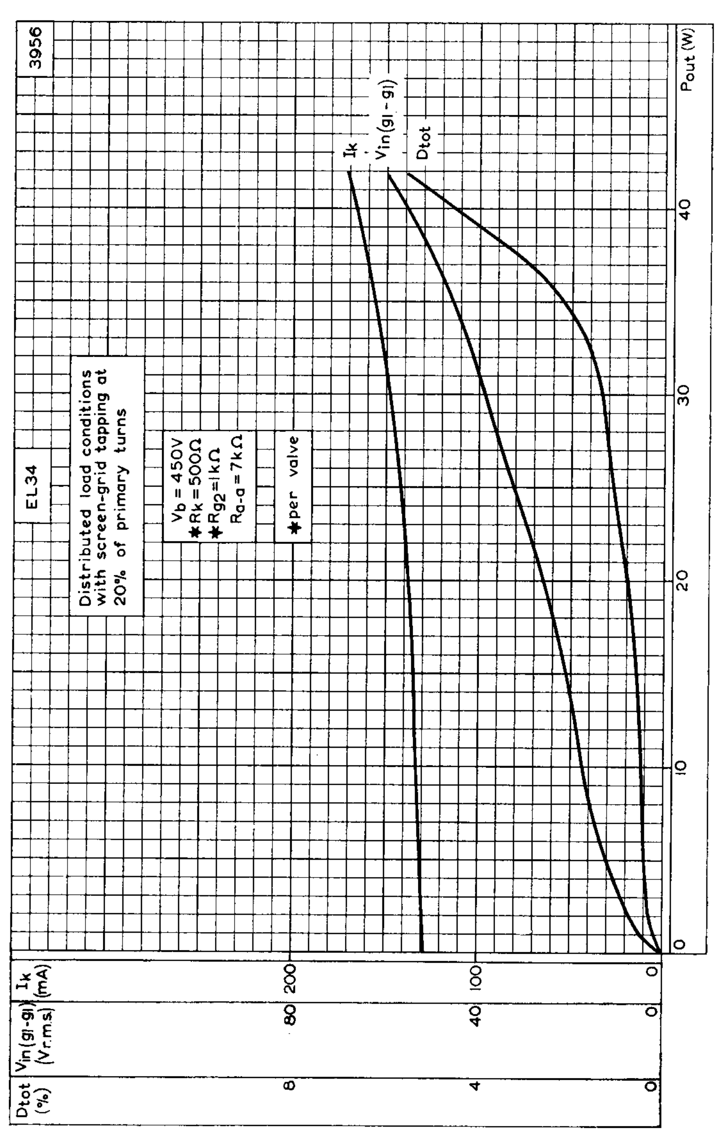
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER WHEN TRIODE CONNECTED



PERFORMANCE OF EL34 WHEN USED AS A SINGLE VALVE CLASS 'A' AMPLIFIER. $V_a = 250V$



PERFORMANCE OF EL34 WHEN USED AS A SINGLE VALVE CLASS 'A' AMPLIFIER. $V_a = 300V$



PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 20% OF PRIMARY TURNS

4839

EL34

Distributed load conditions with screen-grid tapping at 43% of primary turns

$V_a + V_{Rk} = 430V$
$V_{g2} + V_{Rk} = 425V$
$*R_{g2} = 1{\cdot}0k\Omega$
$*R_k = 470\Omega$
$R_{a\text{-}a} = 6{\cdot}0k\Omega$

*per valve

I_k

$V_{in(g1-g1)}$

D_{tot}

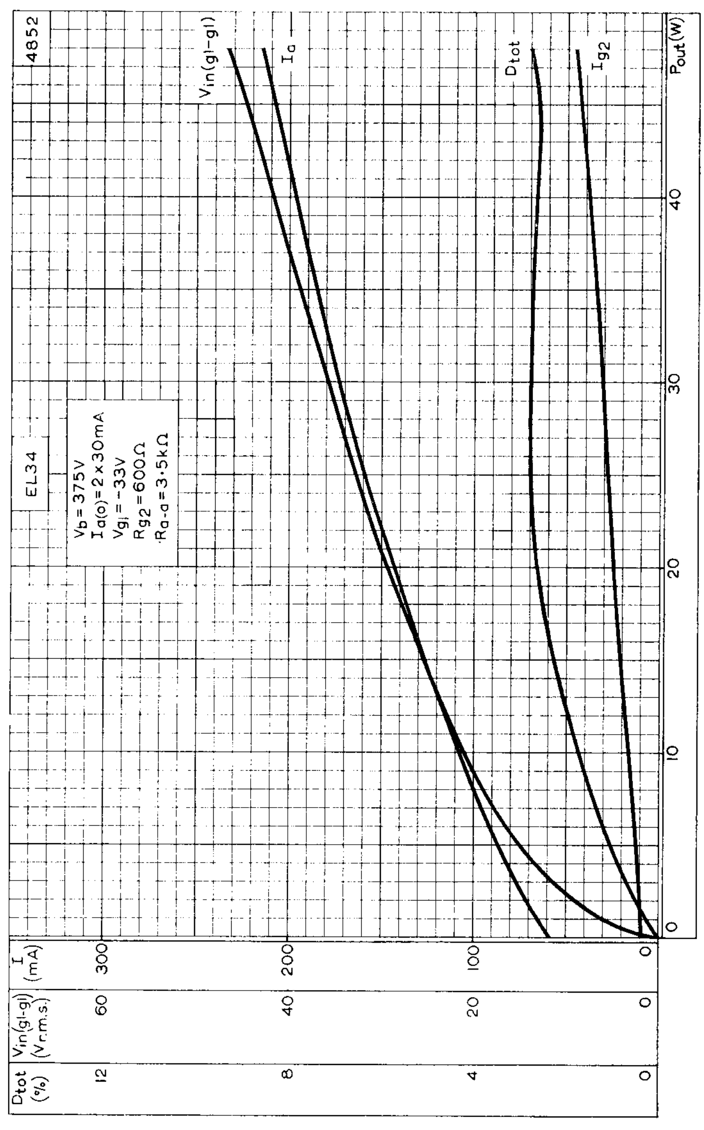
D_{tot} (%): 6, 4, 2, 0

P_{out} (W): 0, 10, 20, 30, 40

I_k (mA): 150, 100, 50, 0

$V_{in(g1-g1)}$ ($V_{r.m.s.}$): 60, 40, 20, 0

PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 43% OF PRIMARY TURNS



PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH FIXED BIAS
$V_b = 375V$

EL34

$V_b = 400V$
$I_{a(o)} = 2 \times 30mA$
$V_{g1} = -36V$
$R_{g2} = 800\Omega$
$R_{a-a} = 3.5k\Omega$

PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH FIXED BIAS
$V_b = 400V$

3939

EL34

$V_b = 375V$
$* R_k = 260\Omega$
$R_{g2} = 470\Omega$
$R_{a-a} = 3{\cdot}5\ k\Omega$
$I_{a(0)} = 2 \times 75mA$

*per valve

D_{tot} (%)	I_{g2} (mA)	$V_{in(g1-g1)}$ ($V_{r.m.s.}$)	I_a (mA)
8	40	80	200
6	30	60	150
4	20	40	100
2	10	20	50
0	0	0	0

P_{out} (W): 0, 5, 10, 15, 20, 25, 30

PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH CATHODE BIAS
$V_b = 375V$



$V_b = 450V$
*$R_k = 465\Omega$
$R_{g2} = 1k\Omega$
$R_{a-a} = 6{\cdot}5k\Omega$
$I_{a(o)} = 2 \times 60mA$

* per valve

PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH CATHODE BIAS
$V_b = 450V$

PERFORMANCE OF TWO EL34 IN PUSH-PULL WHEN TRIODE CONNECTED AND THE CATHODE BYPASSED

3962

EL34

Triode connected

$V_b = 430V$
$I_a = 2 \times 70mA$
$*R_k = 440\Omega$
$R_{a-a} = 10k\Omega$

*per valve, unbypassed

I_a

$V_{in(g1-g1)}$

D_{tot}

P_{out} (W): 0, 4, 8, 12, 16

I_a (mA)	$V_{in(g1-g1)}$ ($V_{r.m.s.}$)	D_{tot} (%)
150	60	1·5
100	40	1·0
50	20	0·5
0	0	0

PERFORMANCE OF TWO EL34 IN PUSH-PULL WHEN TRIODE CONNECTED AND THE CATHODE UNBYPASSED